

ENERGY STAR[®] Data Center Energy Performance Scale Development

Development Timeline:

June 2010 – Original Model Release

Intranet Location:

G:\CPPD\C&I Branch\C&I Tools Team\ENERGY STAR Scale – Reference\Data Center

Primary Data Source:

Survey conducted in 2009 by EPA in coordination with industry associations

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1. Data Center Rating Development Data Collection

These presentations were a series of webinars given to solicit input and launch the data collection process. Each webinar details the progress of the data collection process and an updated timeline that includes the proposed release date of the energy performance scale. The date of the webinar presentation and the name of the presenter(s) are included.

1A: (December 18th, 2007 – Alexandra Sullivan, Paul Scheihing & William Angle)

This presentation was composed of three parts, all of which are intended to explain EPA and DOE's plans to support energy efficiency in data centers while also providing an overview of the new Data Center energy performance scale development process.

1B: (February 13th, 2008 – Alexandra Sullivan)

This presentation detailed the proposed data collection process, establishing key metrics such as the comparison of IT energy and total energy as an indicator of performance (measuring the efficiency of the infrastructure but not the IT equipment).

1C: (March 20th, 2008 – Alexandra Sullivan)

This presentation provided the final data collection form and outlined deadlines for the data collection process.

1D: (May 6th, 2008 – Alexandra Sullivan)

This presentation reviewed the extent of participation and data collected while also answering common questions, such as how to account for chilled water and whether international data centers could participate.

2. Request for Participation in EPA Analysis and Model Testing for Data Center (March 24th, 2008 – Brian Carroll, ICF)

This was a data request given to interested partners and industry representatives to support the development of the Data Center energy performance scale. The participants were asked to monitor and record data for their data centers for a period of one year beginning June 1, 2008. A template for the data request form and instructions on how to participate in the data collection are provided in two separate, additional forms.

3. Data Center Rating Development Update (November 20th, 2008 – Alexandra Sullivan)

These presentations were a series communicating development progress, starting with preliminary review during the data collection and culminating with final model recommendations after data collection and analysis. The presentations include analytical findings, questions to stakeholders, and model recommendations. The dates of the presentations are included below.

3A: (November 20th, 2008)

This presentation reviewed participation to provide a revised timeline for the entire development process while also clarifying several issues to facilitate the completion of participants' submissions (e.g. the classification requirement that a stand-alone data center must occupy at least 40% of an entire building).

3B: (May 7th, 2009)

This presentation included preliminary data analysis examining trends while also soliciting participants' opinions on several developmental decisions, such as whether to allow Power Distribution Unit meter readings in place of Uninterrupted Power Supply (UPS), a separate key metric that was missing from some submissions.

3C: (September 29th, 2009)

This presentation provided a summary of the completed data collection process, a description of the statistical techniques that were being applied to create the model and initial findings and possible model elements were reviewed.

3D: (November 12th, 2009)

This presentation gave an overview of the proposed energy performance scale for the Data Center energy.

4. Data Center Final Model Replication (December 8th, 2009 – Sudhir Paladugu)

This document summarizes email correspondence between EPA and ICF staff during the process of model finalization and replication. A formal replication document was not prepared, but these communications provide a record confirming that the model was successfully replicated independently. Excel files containing calculations of metrics that were replicated separately and the building data they were based on are also included.

5. Data Center Final Data & Lookup Table (December 8th, 2009 – Alexandra Sullivan)

This excel file was used to create the final lookup table. This spreadsheet contains all of the survey data for the 61 data centers used to create the energy performance scale. The only required variable for rating each building is available, which is annual IT energy (i.e. UPS). Also shown are the results of a weighted regression, including the coefficient for the variable representing UPS. The predicted PUE and energy efficiency ratios for each building are then determined and used to create a table listing the score and percentile corresponding to each building.

6. New Data Center Model, Direction for SRA (December 11th, 2009 – Alexandra Sullivan)

This was the technical direction provided to SRA to develop the original data center model for release in June 2010. The document includes complete information on attributes, the prediction equation, the lookup table, eligibility criteria and required score change reports.

7. Development of ENERGY STAR Benchmarking Criteria for Data Centers (July 17th, 2010 – Sara Lisauskas, ICF)

This was a summary memo prepared for all partners who provided building data to EPA (see Item 2). While providing an overview of the Data Center energy performance scale development process, this document explains how any data center can be rated. The document provides the results and overall score for the participants' data center(s).

8. ENERGY STAR Data Center Rating Overview (March 17th, 2010 – Sara Lisauskas, ICF)

This handout provides a brief overview of the ENERGY STAR scale for Data Center and the data collection/development process. This is considered a high-level introduction to benchmarking Data Center.

9. Score Change Report for Test Data of Data Center Rating (March 22nd, 2010 – Alexandra Sullivan)

This document summarizes the initial review of the test data score change report for the Data Center energy performance scale, covering expected changes for the June 2010 model release. The review indicates that score results from SRA could be replicated by EPA and fell within the expected range.

10. Data Center Rating Training (May 19th, 2010 – Alexandra Sullivan & Alyssa Quarforth)

This presentation was given to EPA staff and contractors to help prepare them for the introduction of the new Data Center energy performance scale. The presentation covered basic terms and definitions with respect to data center operations and equipment. Specific items about the development of the scale are presented in the context of Portfolio Manager benchmarking.

11. Analysis of Expected Ratings Changes (February 2009 – Alexandra Sullivan)

This internal memo was prepared for the C&I Branch to analyze the expected score changes resulting from all updates to several energy performance scales in the June 2010 release, including the new Data Center model.

12. Detailed Analysis of Office & Data Center Changes Associated with 2010 Portfolio Manager Release (June 2010 – Alexandra Sullivan)

This memo addressed score changes expected for Offices and Data Centers as a result of Portfolio Manager Updates planned for June 2010. This is a supplemental document to an overall description of the June 2010 changes (see Item 11) and provides a more detailed analysis of changes for the commercial real estate sector. Two major changes are analyzed: the correction in the office model for large buildings and the introduction of a new data center performance scale.

13. Data Center Rating, Frequently Asked Questions (December 21st, 2011 – Alyssa Quarforth and Alexandra Sullivan)

This FAQ document was developed to address industry questions concerning the Data Center energy performance scale and the Portfolio Manager benchmarking requirements.

14. Technical Description for Data Center (June 2010 – EPA & ICF)

This is the publicly available document describing the Technical Methodology for the Data Center energy performance scale. It explains how the model used to score data centers was developed and how it can be systematically applied to all eligible data centers. This document walks readers through each aspect of development and provides the reference data for data center facilities, the characteristic/variable analyzed, the filters applied, the statistical regression results (i.e. the coefficient and predictive formula) and an example calculation.